

## CLAIMS

What is claimed is:

1. A method of measuring for radioactive material, the method comprising:
  - providing a first chamber containing a medium and providing a second chamber containing a medium, the first and second chambers being provided such that the medium can pass through them;
  - placing an item to be measured for radioactive material in the first chamber in contact with the medium;
  - sealing the first and second chambers;
  - providing a detector for ions in contact with the medium of the first chamber;
  - providing a detector for ions in contact with the medium of the second chamber;
  - moving the medium about during measurements;
  - determining the level of ions present in the medium of the first chamber and determining the level of ions present in the medium of the second chamber on one or more occasions; and
  - correcting the level of ions in the first chamber according to the level of ions in the second chamber to give a corrected level, the corrected level of ions in the medium being indicative of a characteristic of the radioactive material.

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SALT LAKE CITY, UTAH 84111

2. A method according to claim 1 in which the first chamber is connected to the second chamber such that medium leaving the first chamber enters the second chamber.

3. A method according to claim 1 in which the second chamber is connected to the first chamber such that medium leaving the second chamber enters the first chamber.

4. A method according to claim 1 in which the medium enters the first chamber then passes to the second chamber then is recycled back to the first chamber.

5. A method according to claim 1 in which a first detector is provided in the first chamber, a second detector is provided in the second chamber and the first and second detectors are distinct from one another.

6. A method according to claim 1 in which the first and second chambers are provided in parallel with one another.

7. A method according to claim 6 in which the first chamber is provided with an inlet and an outlet and the outlet is connected via a passageway to an entrance portion of the first and/or second chambers.

8. A method according to claim 6 in which the second chamber is provided with an inlet and an outlet, the outlet is connected via a passageway to an entrance portion of the first and/or second chambers.

9. A method according to claim 6 in which the entrance portion of the first and/or second chambers is provided with a flow route control, the flow route control allowing the medium to flow into the first chamber alone or alternatively the second chamber alone.

10. A method according to claim 1 in which the level measured in the first chamber is indicative of the ions generated by the contamination on the item and due to any gaseous emitters present and due to any other background events and the level measured in the second chamber is indicative of the ions generated by any gaseous emitters and due to any other background events.

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SALT LAKE CITY, UTAH 84111

11. A method of measuring for radioactive material, the method comprising:
  - placing an item to be measured for radioactive material in a first chamber in contact with a medium;
  - providing a second chamber in contact with the medium, the first chamber and second chamber being provided such that the medium can pass through them;
  - sealing the first and second chambers being sealed;
  - providing a detector for ions in contact with the medium of the first chamber and providing a detector for ions in contact with the medium of the second chamber;
  - moving the medium about during measurements; and
  - determining the level of ions present in the medium of the first chamber and the level of the ions present in the medium of the second chamber on one or more occasions, these ion levels relating to a total count and a background count respectively, the background count being subtracted from the total count to produce a corrected count which is indicative of a characteristic of the radioactive material.

12. An instrument for measuring radioactive materials, the instrument comprising:

a first chamber adapted to receive an item to be measured for radioactive material, the first chamber being selectively sealed to form a first portion of a closed environment;

a first detector communicating with the first chamber, the first detector being configured to produce a first detection signal resulting from the detection of ions within the first chamber;

a second chamber being selectively sealed to form a second portion of the closed environment, the first chamber being either coupled or selectively coupled in sealed fluid communication with the first chamber;

a second detector communicating with the second chamber, the second detector being configured to produce a second detection signal resulting from the detection of ions within the second chamber;

a flow generator for moving a gaseous medium through the first and/or second chamber; and

a processor electrically coupled with the first detector and the second detector, the processor correcting the first detection signal according to the second detection signal.

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12. An instrument comprising:

a first chamber into which an item to be measured for radioactive material is placed;

a second chamber, the first and second chambers being sealed;

a detector being provided in contact with the medium of the first chamber;

a detector being provided in contact with the medium of the second chamber;

a flow generator for moving the medium through the first and/or second chamber; and

a processor for subtracting the detected signal of the second chamber from the detected signal of the first chamber.

13. A method of measuring for radioactive material, the method comprising:

placing an item to be measured for radioactive material in a chamber in contact with a medium;

sealing the chamber;

providing a detector for ions in contact with the medium;

replacing the medium with a further medium; and

measuring the level of ions present in the further medium, the level of ions in the medium being indicative of a characteristic of the radioactive material, the further medium being free of gaseous emitters to a radioactivity level of below  $5\text{Bq/m}^3$ .

15. A method according to claim 14 in which the further medium is the same as the medium, but has been isolated from the atmosphere for at least 5 days.

16. An instrument comprising:

a chamber into which an item to be measured for radioactive material is placed in use, the chamber containing a medium; and

an enclosed reservoir of further medium, the further medium being free of gaseous emitters to a radioactivity level of below  $5\text{Bq/m}^3$ .

TEMPERATURE

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17. A method of measuring for radioactive material, the method comprising:

placing an item to be measured for radioactive material in a chamber in contact with a medium;

sealing the chamber;

providing a detector for ions in contact with the medium; and

moving the medium for a time period prior to a measurement of the level of ions present in the medium being performed, the level of ions in the medium being indicative of a characteristic of the radioactive material.

18. A method according to claim 17 in which the chamber is provided with an inlet and an outlet and the outlet and inlet are joined by a connecting passage.

19. A method according to claim 17 in which the medium is moved about by its leaving the chamber and reentering the chamber at different locations.

20. A method according to claim 18 in which the detector is provided at or near the outlet.

21. A method according to claim 17 in which the measurement is made after one or more checking measurements have been made, the checking measurements investigate the fluctuations in the ion level with time, the measurement being made after the fluctuations in the ion level pass below a threshold.